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厦门大学

硕 士 学 位 论 文

广西近海生态系统健康评价

Guangxi offshore areas ecosystem health assessment

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摘要

海湾由于其深入内陆，和人类存在着天然的联系。而人类活动区域很大程度上是位于沿海地区，海湾生态系统很容易受到人类活动的干扰。因此，开展海湾生态系统健康评价有助于更好的理解海湾生态系统，为海湾生态系统管理提供重要依据，从而更好的促进人与自然的和谐相处。

广西近海位于北部湾北部，属于北部湾典型海区，具有丰富的生物资源、矿产资源、港口资源、旅游资源等优势，开发潜力大。毗邻防城港市、北海市及钦州市，随着近年来泛北部湾经济区的崛起，来自过度捕捞和海水养殖等渔业活动、围填海和滨海工业等海洋开发活动、陆源污染物排放和滨海旅游等人类的活动干扰、以及海水增温、生态灾害频发、生物群落结构异常等全球变化影响，对广西近海生态系统健康构成了多重压力。

本文在对国内外学者对海湾生态系统健康相关概念及研究方法进行阐述筛选后，选用压力—状态—响应（Press—State—Response，PSR）模型构建广西近海生态系统健康评价指标体系，从压力子系统、状态子系统及响应子系统三个方面进行广西近海生态系统健康评价。通过采用综合指数法建立指标体系并进行评价，最终得到广西近海生态系统健康状况得分为0.69，根据生态系统健康评价标准，属于“良”的范围，可认为广西近海生态系统处于良好的状态，生态系统结构和功能完善，受到干扰后的恢复力较强，但很容易受到人类活动干扰而使生态系统退化。具体各子系统的评价结果如下：

（1）压力子系统处于“良”的水平，表明随着社会经济的发展，人类对资源的开发利用活动对海域的生态环境已经造成较大影响，并且人类的影响力已经超过自然生态灾害对环境的影响力。其中对生态系统健康压力最大的为海水养殖，需要今后控制海水养殖面积；围填海活动也需要进行合理监管；旅游资源的开发无秩序无组织，开发机制不够规范。

（2）状态子系统亦属于“良”的范围内。说明广西近海整体状态良好，能维持较为完整的群落结构和正常的能量流动与物质循环，系统对于自然干扰的长期效应具有抵抗力和恢复力，具备自我调控能力。环境质量情况总体较好；生物与生态中潮间带生物及近海海域生物现状较好，但仍需加强保护力度，珍稀濒危物种的现状仍处于一个较危险的状况，虽保护力度已加强，但恢复是一个长期的

过程，还需持续加强保护力度；生物生产力的情况较好，整个生态系统能量流动及物质循环情况较好；生物生境中红树林的保护情况较好，但赤潮及外来物种的入侵对其仍有显著的影响，而海草床及珊瑚礁仍需加强保护力度。

（3）响应子系统的得分为 0.66，可认为当地政府管理工作有力，各项管理工作基本达到生态系统保护的需求，生态系统保护朝着良好的方向进行。其中污水处理率指标、保护区建设与管理规划、法规与政策的分值较高。说明随着广西各级政府部门对环境污染重视程度的不断加深，对污水排放特别是陆源污染向海排放的达标治理工作要求也越来越严格，这对生态系统的保护具有十分重要的意义。人口受教育水平、第三产业所占比重、环境治理投资额以及公众参与相比其它指标分值明显偏低，说明当地在社会响应方面还有需要提升和改进的地方。

根据对评价结果的分析，本文提出几点建议，主要涉及海水养殖面积、外来物种入侵、围填海活动、旅游产业、珍稀濒危物种、建立综合管理机制、建立信息交流平台以及海洋人才培养等八个方面，从而为广西近海生态系统管理提供有效的科学依据。

关键词：广西近海；海湾生态系统健康；海湾生态系统健康评价；PSR 模型

Abstracts

Since the gulf goes deep into the inland, it has natural relationship with human beings. A great number of human activities occurs in the offshore areas, and the gulf ecosystem is vulnerable to interference by human beings. As the results, the gulf ecosystem health evaluation can contribute to a better understanding of the gulf ecosystem and provide an important basis to the gulf ecosystem management in order to promote a better harmony between human beings and nature.

Guangxi offshore areas are located in the north of the Beibu Gulf, near the Fangchenggang city, Beihai city and Qinzhou city. As the keystone places in the Beibu Gulf, Guangxi offshore areas have rich biological nature resources, mineral resources, harbor resources, tourist resources and other superior resources, showing huge developing potential. With the rise of pan-Beibu gulf economic zone in recent years, multiple pressures were exerted on the ecosystem health of Guangxi offshore areas, such as fishery activities like overfishing and aquaculture, marine development activities like reclamation and coastal industry, human activities like terrigenous pollutants and tourism, and global changes like seawater warming, frequent ecological disasters and biological community structure abnormalities.

In this article, previous research work on gulf ecosystem health by domestic and foreign scholars were summarized, and pressure-state-response (PSR) model was selected to construct the gulf ecosystem health evaluation index system through three subsystem known as press subsystem, state subsystem and response subsystem. By the comprehensive index method, the ecosystem health of Guangxi offshore areas were evaluated as the score of 0.69, which represented “good situation” according to the standards of the assessment of ecosystem health. It could be concluded that Guangxi offshore areas ecosystem were under good situation with consummate ecosystem structure and function and strong resilience from disturbance. But it was prone to be interfered by human activities. Specific evaluation results of each subsystem are as followed:

(1) Press subsystem was in “good” situation. It indicated that with the rapid development of social economy, the development and utilization of resources had already brought great effect to the ecology environment, more than that brought by nature ecology disaster. Aquaculture showed the biggest pressure in press subsystem,

so it was necessary to control the aquaculture areas. Coastal reclamation needed to be reasonably supervised as well. Besides, the development of tourism was disordered and disorganized, develop mechanisms were not inadequately standardized.

(2) State subsystem was in "good" situation, indicating the overall good condition in Guangxi offshore areas. The ecosystem was able to maintain relatively complete community structure, normal energy flow and material cycling. Self-regulation ability was equipped to resist and recover from the long-term nature interference. The situation of environment quality was generally good. The condition of intertidal organisms and coastal organisms was satisfied, yet still in the need of strengthened protection. Rare or endangered species stayed dangerous. Although protection efforts had been strengthened, recovery was found out to be a long process and consistent protection was quite necessary. The biological productivity was relatively good, including the entire ecosystem energy flow and material cycling. As for biological habitats, mangrove was being best protected, even though it still suffered a lot from the red tide and alien species invasion. More protection efforts should be done for sea-grass beds and coral reefs.

(3) Response subsystem got the score of 0.66, indicating that the local government has done a good job. All the management work could meet the requirement of ecosystem protection and ecosystem protection has been led onto the correct track. Among all the indexes, the sewage treatment rate index, the protection areas construction and management plan index and regulations and policies index were the highest. It meant that with more attention to environment pollutions by Guangxi government, stricter requirements were executed on sewage treatment especially on terrigenous pollutants treatment. This has important significance for protecting ecosystem. But the education index, tertiary industry index, investment index in environmental governance and public participation index were significantly lower than other indexes, suggesting that there were much space to enhance and improve in the social response.

According to the analysis of the assessment results, this article came up with some suggestions including aquaculture, alien species invasion, coastal reclamation, tourism industry, rare or endangered species, establishment of integrated management system and network cooperation, and the marine talent training, consequently offering scientific advice of ecosystem management in Guangxi offshore areas.

Keywords: Guangxi offshore areas; gulf ecosystem health; gulf ecosystem health evaluation; PSR model

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